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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/491,353	01/26/2000	Fehmi Cirak	06618/505001/CIT-3061	8437

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EXAMINER

DAY, HERNG DER

ART UNIT	PAPER NUMBER
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2123

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DATE MAILED: 03/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/491,353

Applicant(s)

CIRAK ET AL.

Examiner

Hemg-der Day

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 26 January 2000.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 January 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

1. Claims 1-24 have been examined and claims 1-24 have been rejected.

***Priority***

2. Applicant's claim for domestic priority under 35 U.S.C. 119(e) is acknowledged. The provisional application number is 60/151,618, filed August 31, 1999.

***Abstract***

3. The abstract of the disclosure is objected to because it exceeds 150 words in length. Correction is required. See MPEP § 608.01(b).

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-2, 4-5, 9-10, 12-13, 17-18, and 20-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Groothuis et al., U.S. Patent 5,581,489 issued December 3, 1996.

- 5-1. Regarding claim 1, Groothuis et al. disclose a method of performing finite element analysis on a shell including (abstract; and summary, column 1 line 47 through column 2, line 27):

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(a) modeling the geometry of the shell using subdivision surfaces (subdivisions, column 3, lines 61-65);

(b) characterizing an environment for the shell, including environmental factors affecting the mechanical behavior of the modeled shell (materials information, column 4, lines 13-30);

(c) computing the mechanical response of the modeled shell, taking into account the characterized environment, using a finite element analysis (finite element analysis processor, column 5, lines 30-43); and

(d) outputting a description of the geometry of the modeled shell as determined from the computed mechanical response (displays, column 5, lines 47-54).

**5-2.** Regarding claim 2, Groothuis et al. further disclose the environment factors includes loading conditions, material properties, and boundary conditions for the modeled shell (input data, column 3, lines 58-61; and thermal output data, column 4, line 62 through column 5, line 3).

**5-3.** Regarding claim 4, Groothuis et al. further disclose the loading conditions include an indication of thermal loading (thermal output data, column 4, line 62 through column 5, line 3).

**5-4.** Regarding claim 5, Groothuis et al. further disclose outputting indications of the characterized environment (output data, column 5, lines 11-29; and displays, column 5, lines 47-54).

**5-5.** Regarding claims 9-10 and 12-13, these system claims include same method limitations as in claims 1-2 and 4-5 and are anticipated using the same analysis of claims 1-2 and 4-5.

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5-6. Regarding claims 17-18 and 20-21, these computer program claims include same method limitations as in claims 1-2 and 4-5 and are anticipated using the same analysis of claims 1-2 and 4-5.

6. Claims 8, 16, and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Buchanan, "Schaum's Outline of Theory and Problems of Finite Element Analysis", The McGraw-Hill Companies, Inc., 1995.

6-1. Regarding claim 8, Buchanan discloses a method for performing finite element analysis using subdivision basis functions, including:

(a) inputting a mesh comprising a set of data points each having connectivity to neighboring data points, the mesh defining physical parameters (Fig. 7-11, page 230);

(b) specifying an initial state for the mesh (Fig. 7-11, page 230; and problem 7.18, page 231);

(c) defining a set of linear differential equations comprising a stiffness matrix and an external forcing vector (stiffness matrix and load vector, solution 7.18, page 231), at least one such equation having a fourth order differential operator (the governing equation for plate bending is a fourth-order differential equation, section 7.7, page 210);

(d) solving the set of linear equations as applied to the mesh (results are given, solution 7.18, page 231);

(e) outputting the solution to the set of linear equations as defining a modification of the initial state of the mesh based on the stiffness matrix and in response to the external forcing vector (Table 7.4, page 232).

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6-2. Regarding claim 16, this system claim includes same method limitations as in claim 8 and is anticipated using the same analysis of claim 8.

6-3. Regarding claim 24, this computer program claim includes same method limitations as in claim 8 and is anticipated using the same analysis of claim 8.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 3, 11, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Groothuis et al., U.S. Patent 5,581,489 issued December 3, 1996, as applied to claim 1, and in view of Buchanan, "Schaum's Outline of Theory and Problems of Finite Element Analysis", The McGraw-Hill Companies, Inc., 1995.

8-1. Regarding claim 3, Groothuis et al. disclose a method of generating a model of an object for use in finite element analysis (abstract). Groothuis et al. suggest the result of a finite element analysis is to predict the effect on an object of heat transfer, mechanical stress, and thermal stress (column 1, lines 43-45). However, Groothuis et al. only emphasize the analysis of heat transfer and thermal stress instead of mechanical stress, Groothuis et al. fail to expressly disclose the loading conditions include an indication of applied forces.

Buchanan discloses a solved mechanical stress problem to explain the application of the finite element analysis to plate-bending problems. In the exemplary problem, the square plate is

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simply supported with a 1000-lb load applied at the center node (problem 7.18, page 231). It indicates that including applied forces, therefore, is inherent in solving mechanical stress problem by finite element analysis.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Groothuis et al. to incorporate the teachings of Buchanan to obtain the invention as specified in claim 3 because Buchanan discloses in detail the loading conditions include an indication of applied forces, which is inherent in solving mechanical stress, for example, thin-plate bending, problems.

**8-2.** Regarding claim 11, this system claim includes same method limitations as in claim 3 and is anticipated using the same analysis of claim 3.

**8-3.** Regarding claim 19, this computer program claim includes same method limitations as in claim 3 and is anticipated using the same analysis of claim 3.

**9.** Claims 6-7, 14-15, and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Groothuis et al., U.S. Patent 5,581,489 issued December 3, 1996, as applied to claim 1, and in view of Applicants' admissions.

**9-1.** Regarding claims 6 and 7, Groothuis et al. disclose using one of several commercially available finite element analysis processors (column 1, lines 24-32). However, Groothuis et al. fail to expressly disclose the finite element analysis uses (1) subdivision basis functions as shape functions; (2) suitably smooth shape functions.

The fundamental concept of the finite element method is well known. Each element is defined using an interpolation function to describe its behavior between its nodes. The shape function is usually the coefficient that appears in the interpolation polynomial and is written for

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each individual node of a finite element. Therefore, using shape function is necessary and inherent in finite element analysis. Applicants present and discuss prior art shape functions in appendix of the specification (pages 42-44).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Groothuis et al. to incorporate the prior art shape functions disclosed in the Applicants' specification to obtain the invention as specified in claims 6 and 7 because using shape function is necessary and inherent in finite element analysis.

9-2. Regarding claims 14 and 15, these system claims includes same method limitations as in claims 6 and 7 and are anticipated using the same analysis of claims 6 and 7.

9-3. Regarding claims 22 and 23, these computer program claims includes same method limitations as in claims 6 and 7 and are anticipated using the same analysis of claims 6 and 7.

### ***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Reference to Loop, U.S. Patent 5,602,979 issued February 11, 1997, is cited as disclosing a method for modeling smooth free-form shapes.

Reference to Migdal et al., U.S. Patent 6,356,263 issued March 12, 2002, and filed January 27, 1999, is cited as disclosing adaptive subdivision of mesh models.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Herng-der Day whose telephone number is (703) 305-5269. The examiner can normally be reached on 8:30 - 17:00.

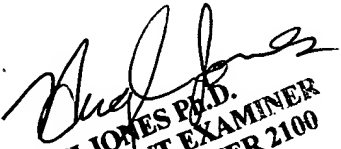


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin J Teska can be reached on (703) 305-9704. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-7239 for regular communications and (703) 746-7238 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Herng-der Day  
March 14, 2003

  
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